Chapter 2

Evaluating Nutrition Information

Chapter Learning Outcomes

After reading Chapter 2, you should be able to:

1. Define terms, including anecdote, variable, epidemiology, placebo, placebo effect, peer review, and quackery.
2. Explain the basis of the scientific method as it is used in developing hypotheses and conducting research in the field of nutrition.
3. Explain the importance of having controls when performing experiments.
4. Define research bias.
5. Describe how to identify questionable sources of nutrition information.
6. Identify reliable sources of nutrition information.

In the early 1900s, the disease pellagra was widespread in the United States, especially in southern states. Individuals with pellagra were weak, and they developed diarrhea, a skin rash, and mental confusion. Each year, thousands of Americans died from this dreaded illness.

In 1914 the U.S. surgeon general assigned Joseph Goldberger, a physician who worked in a federal government laboratory, to study pellagra. Most medical experts thought pellagra was an infectious disease because
it often occurred where people lived in close quarters, such as prisons, orphanages, and mental health institutions. Goldberger knew from his previous research that infectious diseases usually spread through a population by close physical contact. While investigating factors associated with pellagra, Goldberger observed that not everyone who was exposed to people suffering from pellagra developed the condition. For example, many prisoners had pellagra, but none of their guards or prison administrators suffered from the disease, even though they associated closely with the affected inmates. Based on his observations, Goldberger rejected the medical establishment’s notion that pellagra was an infectious disease.

Dr. Goldberger also noted that prisoners ate a diet that was typically eaten by other people with pellagra. The diet emphasized corn bread, hominy grits (a corn product), molasses, potatoes, cabbage, and rice. At the time, this monotonous low-protein diet was associated with poverty throughout the southern United States. He also observed that people who did not develop pellagra had higher incomes and ate more meat, milk, and fresh vegetables. Goldberger developed the hypothesis that pellagra resulted from the lack of something in poor people’s diet. A hypothesis is a possible explanation for an observation that guides scientific research. Goldberger hypothesized that the missing dietary factor was in meat, milk, and other foods eaten regularly by people with high incomes. To test his hypothesis, Goldberger gave these foods to children in two Mississippi orphanages and patients in a Georgia mental institution who were suffering from pellagra, and they were cured of the disease. Despite the results of Goldberger’s experiment, many members of the medical establishment rejected his finding that a poor diet was the cause of pellagra, and they continued to think pellagra was an infectious disease.

To satisfy his critics, Goldberger enrolled a group of healthy, Mississippi prison inmates in an experiment that involved consuming the corn- and molasses-based diet commonly eaten in the southern states at the time. After a few months, more than half of the inmates developed cases of pellagra, confirmed by medical experts who were not associated with Goldberger. Once again, however, many of Goldberger’s critics rejected his finding that poor diet was the cause of pellagra.

In 1916, Dr. Goldberger decided to end the controversy by experimenting on himself and some volunteers during what they called a “filth party.” The group applied secretions taken from inside the nose and throat of a patient with pellagra into their noses and throats; they also swallowed pills made with flakes of skin scraped from the rashes of people with the disease. Additionally, Goldberger and one of his colleagues gave each other an injection of blood from a person who had pellagra. If pellagra were infectious, filth party participants should have contracted the disease—but none of them did. Despite the results of Dr. Goldberger’s extraordinary experiment, a few physicians still resisted the idea that pellagra was associated with diet.1

Dr. Goldberger died in 1929—eight years before Dr. Conrad Elvehjem and his team of scientists at the University of Wisconsin isolated a form of the vitamin niacin from liver extracts. Elvehjem and his colleagues discovered niacin cured “black tongue,” a condition affecting dogs that was similar to pellagra.2 Not long after Elvehjem’s findings were published, niacin was determined to be effective in treating pellagra, and the medical establishment finally accepted the fact that the disease was the result of a dietary deficiency.

Quiz YOURSELF

Before reading the rest of Chapter 2, test your knowledge of scientific methods and reliable sources of nutrition information by taking the following quiz. The answers are on page 46.

1. Scientists generally do not raise questions about or criticize the conclusions of their colleagues’ research data, even when they disagree with those conclusions.
   ______T______ F

2. Popular health-related magazines typically publish articles that have been peer-reviewed.
   ______T______ F

3. By conducting a prospective epidemiological study, medical researchers can determine risk factors that influence health outcomes.
   ______T______ F

4. A placebo contains ingredients that provide no measurable effects.
   ______T______ F

5. In general, registered dietitians are reliable sources of food and nutrition information.
   ______T______ F
Today, the idea that something missing in diets can cause a nutrient deficiency disease is widely accepted. A hundred years ago, however, it was a novel idea that most medical experts dismissed because they thought only “germs” caused disease. It is interesting to note that raw corn actually contains niacin, but it is in a form the body cannot digest. Furthermore, consuming meat and milk helps prevent pellagra because these foods contain tryptophan, a component of proteins that the body can convert to niacin.

A more recent example of the time and effort it takes to gain support for a medical hypothesis that opposes established beliefs is the case of the mysterious microbe. In the mid-1950s, the medical community generally accepted the cause of peptic ulcers (stomach sores) as stress and poor diet. Monkeys and rodents living under stressful conditions and humans recovering from severe burns often developed such ulcers. In 1982, Australian physicians Barry Marshall and Robin Warren isolated a type of bacteria from the stomachs of patients with gastritis, inflammation of the stomach lining that can result in peptic ulcers. Marshall and Warren hypothesized that this microbe might be related to the development of gastritis and peptic ulcers, and they suggested treating the conditions with antibiotics. Initially other physicians were skeptical about Marshall and Warren’s hypothesis because it challenged traditional medical beliefs and treatment practices. Traditional treatment for gastritis and peptic ulcers generally included antacids and a bland diet, not antibiotics. To provide support for his idea, Marshall actually swallowed some of the bacteria and developed severe stomach inflammation as a result. Then other researchers published articles that confirmed the presence of a type of bacteria that was capable of living in human stomachs and likely responsible for certain chronic stomach ailments. Within a few years, the medical profession accepted the idea that the bacterium (Helicobacter pylori or H. pylori) was a primary cause of gastritis and peptic ulcers (Fig. 2.1). Today people with peptic ulcers who test positive for H. pylori are treated with antibiotics that kill the bacterium. In 2005, Marshall and Warren received the Nobel Prize in medicine for their groundbreaking research and scientific contribution to medical care.

These experiences are just two of many fascinating examples that illustrate how researchers use scientific methods to solve medical mysteries relating to nutrition and health. As in these cases, it is not unusual for scientists to refrain from making quick judgments about a novel nutrition hypothesis until it undergoes repeated testing. Thus it often takes many years before a scientific discovery becomes widely accepted by other experts in the nutrition field.

How do nutrition scientists determine facts about foods, nutrients, and diets? Why do nutrition scientists seem to contradict themselves so much? How can you evaluate the reliability of nutrition information? Where can you obtain up-to-date, accurate nutrition information? Chapter 2 will provide answers to these questions and help you become a more critical and careful consumer.
Understanding the Scientific Method

Scientists ask questions about the natural world and follow generally accepted, standardized methods to obtain answers to these questions. In the past, nutrition facts and dietary practices were often based on intuition, common sense, “conventional wisdom” (tradition), or anecdotes (personal reports of experiences). Today, dietitians and other nutrition experts discard conventional beliefs, explanations, and practices when the results of current scientific research no longer support them.

Nutrition researchers generally rely on scientific methods that may involve making observations, asking questions and developing hypotheses, performing tests, and collecting and analyzing data (information) to find relationships between variables. A variable is a factor such as a person’s age, weight, or environment that can change and influence an outcome. After analyzing data, researchers draw conclusions from the information and report on the findings. Other scientists can test the findings to support or refute them. Figure 2.2 presents the general steps nutrition researchers take when conducting scientific investigations. The following sections take a closer look at some common methods that scientists use to collect nutrition information and establish nutrition facts.

Epidemiological Studies

For decades, medical researchers have noted differences in rates of chronic diseases and causes of death among various populations. The most common type of diabetes, for example, occurs more frequently among Mexican and non-Hispanic African-American adults than among non-Hispanic, white American adults. Additionally, breast cancer is more common among non-Hispanic, white females than females who are members of other American racial or ethnic groups. Epidemiology is the study of disease rates among different population groups, factors associated with the occurrence of diseases, and how diseases spread in a population. Epidemiologists often rely on physical examinations of people to obtain health data (Fig. 2.3). Additionally, they may collect information by conducting surveys, the use of questionnaires that ask people about their attitudes and practices.

Designing Epidemiological Studies

Epidemiological studies often have case-control, prospective, or retrospective designs. Such investigations can provide epidemiologists with clues about the causes, progression, and prevention of the disease. In a case-control study, individuals with a health condition (cases) such as stomach cancer are matched to persons with similar characteristics who do not have the condition. By analyzing the results of case-control studies, scientists may be able to identify
dietary factors that differ between the two groups, such as long-term fruit and vegetable intakes. Dr. Goldberger’s efforts to determine the cause of pellagra involved comparing cases of the disease with people who lived in the same area but were healthy.

A prospective study follows a large group of healthy people over time to determine whether those with a certain characteristic develop a disease and those without that characteristic remain disease-free. (Prospective means “to look forward.”) The Framingham Study that began in 1949 in Framingham, Massachusetts, is one of the most well-known prospective studies. At the beginning of the study, the over 5200 healthy participants (men and women) underwent extensive physical examinations and questioning about their family and personal medical histories as well as their lifestyle practices. Over the following years, a group of medical researchers periodically collected data concerning each participant’s health and, if the person died, cause of death. The scientists analyzed this information and found relationships between a variety of personal characteristics and health outcomes. Findings from the Framingham Study identified numerous risk factors for heart disease, including elevated blood cholesterol levels, cigarette smoking, and hypertension (chronic high blood pressure). Today, medical researchers are still collecting information from the original Framingham Study participants as well as their descendants.

In some prospective studies, researchers perform an intervention, such as a specific dietary or behavioral change, on a group of people (the treatment or experimental group), and the results of the intervention are monitored over a long period. Data collected from the treatment group are compared to a population with similar characteristics who has not made the specific change during the same period (the control group). If the data indicate that the health of the treatment group differs from the health of the control group, the researchers may associate the difference with the intervention. A team of researchers, for example, gives a dietary supplement that contains an extract made from the bark of a tree that grows in South America to a group of healthy people and monitors their blood cholesterol levels. At the end of the treatment period, the team compares cholesterol levels of the treatment group to cholesterol levels of a group of healthy people with similar characteristics who did not take the tree bark supplement. The results of this study may indicate whether the supplement affects blood cholesterol levels.

To conduct a retrospective study, researchers identify a group of people who already suffer from a disease and compare them, particularly their past lifestyle practices, to a group of people with similar characteristics who do not have the disease. (Retrospective means to “look back.”) The results may identify long-term factors that may have been responsible for the illness. For example, researchers compare the dietary histories of a group of people suffering from hypertension to the dietary histories of a group of people with similar characteristics but healthy blood pressures. By comparing the dietary data collected from the two groups, researchers can identify foods that may be associated with the development of hypertension.

Limitations of Epidemiological Studies

By studying differences in dietary practices and disease occurrences among populations, epidemiologists may establish nutritional hypotheses for the prevalence of certain diseases. If one group of people is more likely to develop a certain health disorder than another group, and the two populations consume very different diets, scientists can speculate about the role diet plays in this difference. For example, results of several epidemiological studies indicate that the incidence of breast cancer is higher among women in Western countries than women in Asian countries, and Western women generally have lower intakes of soy products than women with Asian ancestry.\(^5\,6\,7\) Based on this information, you might conclude that eating a low-soy diet causes breast cancer, but is your conclusion valid?

Although it appears that a low-soy diet increases the risk of breast cancer in females, epidemiological studies cannot establish causation, that is, whether a practice is responsible for an effect. When two different natural events occur simultaneously
within a population, it does not necessarily mean they are correlated. A **correlation** is a relationship between variables. A correlation occurs when two variables change over the same period, such as when a country’s percentage of overweight people increases as its population’s intake of sugar-sweetened soft drinks also increases. In this case, the correlation is **direct or positive** because the two variables—body weight and regular soft drink consumption—are changing in the same direction; they are both increasing. An **inverse or negative** correlation occurs when one variable increases and the other one decreases. An example of an inverse correlation is the relationship between diet and hypertension; as a population’s fresh fruit consumption increases, the prevalence of hypertension in that population tends to decrease.

What appears to be a correlation between a behavior and an outcome could be a coincidence, that is, a chance happening, and not an indication of a **cause-and-effect relationship** between the two variables. For example, in a survey of lemonade consumption in Colorado over a 10-year period, we might observe that fewer people drank lemonade during the winter than during the summer months. In a survey of snow skiing accidents in Colorado during the same 10-year period, we might also find that snow skiing accidents were more likely to occur during the winter than in the summer. Thus, as lemonade consumption declined, snow skiing accidents increased. Does this mean lemonade consumption is inversely correlated to skiing accidents, and people who do not drink lemonade have a greater risk of having a skiing accident at this time of year? It is more likely that the relationship between snow skiing and lemonade drinking is coincidental, because both activities are associated with seasonal weather conditions. Although this example is obviously far-fetched, it illustrates the problems scientists can have when analyzing results of epidemiological studies.

In cases involving chronic diseases such as cancer, it is difficult to determine a single variable that is responsible for the development of the condition. Multiple factors, including a person’s genetic susceptibility (inherited proneness) to develop the disease, usually influence whether the chronic disease occurs. For example, many environmental, physiological, and lifestyle variables are responsible for the development of breast cancer in women. According to results of epidemiological studies, body weight, alcohol consumption, and age are some of the variables that influence a woman’s risk of breast cancer. Therefore, it is possible that variables besides soy intake account for the different rates of breast cancer observed between Western and Asian women.

**Experimentation**

Many variables may influence the outcome of an epidemiological study. Thus, scientists performing research to determine the effect or effects of a single variable need to **control** the influence of other variables. Such testing is often done in laboratory settings. Nutrition researchers can perform controlled laboratory experiments on components derived from living organisms (in vitro or “test tube” experiments) or on whole living organisms (in vivo experiments). Nutrition scientists often conduct in vivo experiments on small mammals, particularly mice or rats that are raised for experimentation purposes. These rodents are inexpensive to house in laboratories, and their food and other living conditions can be carefully controlled (Fig. 2.4). Because of the physiological differences between humans and other mammals, medical researchers must be careful when applying the results of animal studies to people. Nevertheless, scientists are often able to determine the safety and effectiveness of treatments by conducting research on laboratory animals before engaging in similar testing on humans.

The findings of research involving a group of human subjects are more likely to be generalized to other people; however, conducting experiments on humans can be costly and often involves ethical concerns. Furthermore, people are not likely to enroll in clinical studies. Clinical studies may require living in tightly controlled settings such as...
the nutrition research unit of a major university’s medical school for a few days or weeks. Such participation would likely restrict people’s lifestyles too much. Nutrition scientists recognize that valuable information can be collected from recruiting subjects who are able to go about their usual routines. Thus, researchers can design studies to allow subjects to maintain their lifestyle practices, except for the variable being studied.

**Reviewing Human Subjects Research Design**  
Scientists must follow U.S. federal guidelines when performing research involving human subjects. Before conducting this type of research, scientists must have the study design scrutinized by their institution’s human subjects’ review committee. To pass the review, a study generally should avoid causing physical and psychological harm or discomfort to subjects beyond that which may be encountered in daily life or during a routine physical examination. Additionally, adult subjects must provide legally obtained informed consent indicating they are aware of the benefits and risks of the research effort and are willing participants.

**Reviewing the Scientific Literature**  
Before nutrition scientists design studies, they perform a review of literature that involves a search of scientific articles previously published on their topic of interest. For example, a team of scientists plans to conduct a 5-year intervention study to determine the effects of adding 15 grams of soy/day to the diets of women who have higher than average risks of breast cancer. The scientists read articles concerning research that examined the effects of soy intake on breast cancer risk to learn what is known about them. Additionally, the findings and conclusions of the previous research may raise questions that can be explored in a new study.

**Developing a Hypothesis**  
After performing the literature review, our team of scientists can develop one or more hypotheses, such as: “Increasing soy intake to 15 grams daily reduces the risk of breast cancer in American women.” Another hypothesis might be: “Daily consumption of wafers that provide a total of 15 grams of soy reduces the risk of breast cancer in women.” The results of analyzing data gathered from this study may support or refute each hypothesis.

**Conducting Human Research**  
To reduce the likelihood that the results of the soy study occur by chance, the researchers enroll a large group of healthy women (2000, for example) who have higher than average risk of breast cancer in the study. Subjects are randomly assigned into two groups; 1000 are in the treatment group and 1000 are in the control group. Random assignment helps ensure that the members of the experimental and control groups have similar variables, such as age and other characteristics.

The investigative team provides a supply of wafers to the treatment group’s participants and instructions concerning their daily consumption. By following these instructions, each treatment group member will consume 15 grams of soy/day. Members of the control group are also given a supply of wafers, but their wafers are placebos that do not contain soy. Placebos are not simply “sugar pills”; they are a fake treatment, such as a sham pill, injection, or medical procedure. A placebo wafer looks, smells, and tastes like the wafer that actually contains soy, except its ingredients are inert, that is, they are not known to produce any measurable physical changes in the people eating them. Both groups are given the same instructions concerning their food intake, dietary record keeping, and health care reporting for the duration of the study.

Why do scientists often use placebos? Some people report positive or negative reactions to a treatment even though they received the placebo. If a patient believes a medical treatment will improve his or her health, the patient is more likely to report positive results for the therapy. Such wishful thinking is called the placebo effect.
Providing placebos to members of the control group enables scientists to compare the extent of the treatment’s response with that of the placebo. People who take herbal products or use unconventional medical therapies to prevent or treat diseases are often convinced the products and treatments are effective despite the general lack of scientific evidence to support their beliefs. For some people, placebos can produce beneficial physiological and psychological changes, particularly in conditions that involve pain or depression. Because subjects in the control group believe they are receiving a real treatment, their faith in the “treatment” can stimulate the release of chemicals in the brain that alters pain perception, reducing their discomfort. Therefore, when people report that a treatment was beneficial, they may not have been imagining the response, even when they were taking a placebo.

**Double-blind Studies** Randomized human studies are usually double-blind—that is, both the investigators and subjects are not aware of the subjects’ group assignments. Codes are used to identify a subject’s group membership, and this information is not revealed until the end of the study. Maintaining such secrecy is important during the course of a human study involving placebos, because researchers and subjects may try to predict group assignments based on their expectations. If the investigators who interview the participants are aware of their individual group assignments during the study, they may unwittingly convey clues to each subject, perhaps in the form of body language, that could influence the subject’s belief about being in the experimental or control group. Subjects who suspect they are in the control group and taking a placebo may report no changes in their condition, because they expect a placebo should have no effect on them. On the other hand, subjects who think they are in the treatment group could insist that they feel better or have more stamina as a result of the treatment, even though the treatment may not have produced any measurable changes in their bodies. Ideally, subjects should not be able to figure out their group assignment while researchers are collecting information from them.

**Analyzing Data, Drawing Conclusions, and Reporting Findings**

Nutrition researchers use a variety of statistical methods to analyze data collected from observations and experiments. These methods may enable the researchers to find relationships between the variables and health outcomes that were studied. As a result, scientists can determine whether their hypotheses are supported by the data. According to results of our example study investigating the effects of soy intake on breast cancer risk, the rate of new cases of breast cancer was 3/1000 among members of the experimental group and 25/1000 among the members of the control group. Based on their analyses, the scientists concluded that eating at least 15 grams of soy daily for 5 years may reduce the risk of breast cancer in women who have high risk of the disease.

When an experiment or study is completed and the results analyzed, researchers summarize the findings and seek to publish articles with information about their investigation in scientific journals. Before articles are accepted for publication, they undergo peer review, a critical analysis conducted by a group of “peers.” Peers are investigators who were not part of the study but are experts involved in related research. If peers agree that a study was well conducted, its results are fairly represented, and the research is of interest to the journal’s readers, these scientists are likely to recommend that the journal’s editors publish the article. Examples of peer-reviewed medical and nutrition journals include the Journal of Nutrition, American Journal of Clinical Nutrition, The New England Journal of Medicine, Journal of the American Medical Association, Nutrition Reviews, and Journal of the American Dietetic Association.
Research Bias  Scientists expect other researchers to avoid relying on their personal attitudes and biases when collecting and analyzing data, and to evaluate and report their results objectively and honestly. This process is important because much of the scientific research that is conducted in the United States is supported financially by the federal government, nonprofit foundations, and drug companies and other private industries. Some funding sources can have certain expectations or biases about research outcomes, and as a result, they are likely to finance studies of scientists whose research efforts support their interests. The beef industry, for example, might not fund scientific investigations to find connections between high intakes of beef and the risk of certain cancers. On the other hand, the beef industry might be interested in supporting a team of scientists whose research indicates a high-protein diet that contains plenty of beef is useful for people who are trying to lose weight.

Peer-reviewed journals usually require authors of articles to disclose their affiliations and sources of financial support. Such disclosers may appear on the first page or at the end of the article. By having this information, readers can decide on the reliability of the findings. Although peer review helps ensure that the scientists are as ethical and objective as possible, it is impossible to eliminate all research bias.

Spreading the News  

After the results of a study are published in a nutrition-related journal or reported to health professionals attending a meeting of a nutrition or medical society, the media (e.g., newspapers, magazines, Internet news sources) may receive notice of the findings. If the information is simplistic and sensational, such as a finding that drinking green tea can result in permanent weight loss, it is more likely to be reported in the popular press. In many instances, you learn about the study’s results when they are reported in a television or radio news broadcast as a 15- or 30-second “sound bite.” Such sources generally provide very little information concerning the way the study was conducted or how the data were collected and analyzed.

Popular sources of nutrition information, such as magazines and newspapers, generally do not subject articles to peer review or other scientific scrutiny, and as a result, they may feature articles and columns with faulty, biased information. Some newspapers, magazines, and Internet news sites contain brief articles or columns that summarize research conclusions extracted from scientific journal articles. Although these secondary sources may contain accurate information, they may provide an unbalanced review of the research if they reflect the biases of the summaries’ authors. For example, a health news column in a popular magazine may report findings from a few nutrition journal articles that support the use of garlic supplements for reducing blood cholesterol levels. However, you may conclude that the column is biased if it excludes results of other studies that do not indicate such benefits.

You can often distinguish a peer-reviewed scientific journal from a popular magazine simply by looking at their covers and skimming their pages. Compared to scientific journals, magazines typically have more colorful, attractive covers and photographs, and their articles are shorter and easier for the average person to read (Fig. 2.5).

It is important to keep in mind that sensational media coverage of a medical “breakthrough” is not necessarily an indication of the value or quality of research that resulted in the news story, magazine article, or newspaper column. More research is often necessary for scientists to determine whether the results of a widely reported study are valid and can be generalized to other populations.

Following Up with More Research  

The results of one study are rarely enough to gain widespread acceptance for new or unusual findings or to provide a basis for nutritional recommendations. Thus, the findings obtained by one research team must be supported by those generated in other studies. If the results of several scientific investigations conducted under similar conditions confirm the original researcher’s conclusions, then these findings are more likely to be accepted by other nutrition scientists.
**Confusion and Conflict** One day the news highlights dramatic health benefits from eating garlic, dark chocolate, or whole grains. A few weeks later, the news includes reports of more recent scientific investigations that do not support the earlier findings. When consumers become aware of conflicting results generated by nutrition studies, they often become confused and disappointed. As a result, some people may mistrust the scientific community and think nutrition scientists do not know what they are doing.

Consumers need to recognize that conflicting findings often result from differences in the ways various studies are designed. Even when investigating the same question, different groups of scientists often conduct their studies and analyze the results differently. For example, the numbers, ages, and physical conditions of subjects; the type and length of the study; the amount of the treatment provided; and the statistical tests used to analyze results typically vary among studies. Additionally, individual genetic differences often contribute to a person’s response to a treatment. Not only are people genetically different, they also have different lifestyles, and they typically recall dietary information and follow instructions concerning health care practices differently. These and other factors can influence the results of nutrition research involving human subjects.

The science of nutrition is constantly evolving; old beliefs and practices are discarded when they are not supported by more recent scientific evidence, and new principles and practices emerge from the new findings. By now you should understand that science involves asking questions, developing and testing hypotheses, gathering and analyzing data, drawing conclusions from data, and sometimes, accepting change.

### Concept Checkpoint

1. What is epidemiology?
2. Explain the importance of having a control group when conducting experimental research.
3. What is the major difference between a prospective study and a retrospective study?
4. What is a “placebo”? Why are placebos often used in studies involving human subjects?
5. What is a “double-blind study”?
6. What is a “peer-reviewed” article?
7. Explain why results of similar studies may provide different findings.

### Nutrition Information: Fact or Fiction

While “channel surfing” one afternoon, you stop and watch the host of a televised home shopping program promote FatMegaMelter, his company’s brand of a dietary supplement for losing weight. According to the host, the supplement contains a chemical derived from a plant that grows naturally in South Africa. This amazing chemical reduces the appetite for fattening foods, enabling an overweight person taking FatMegaMelter to lose up to 30 pounds in 30 days, without the need to exercise more or eat less. The host interviews an attractive young actress who claims to have lost a lot of weight after she started taking FatMegaMelter pills. A few days later, a friend mentions that she has lost three pounds since she began taking this product a week ago. You would like to lose a few pounds without resorting to restricting your food intake or exercising. Should you take FatMegaMelter? The supplement helped the actress and your friend; will it help you?

Although the actress’s health history appears to be compelling evidence that the weight-loss supplement is effective, her information is a *testimonial*, a personal endorsement of a product. People are usually paid to provide their testimonials for advertisements, therefore their remarks may be biased (slanted) in favor of the product.
Your friend’s experience with taking the same weight-loss product is intriguing, but it is an anecdote and not proof that FatMegaMelter promotes weight loss. When your source of nutrition information is a testimonial, anecdote, or advertisement, you cannot be sure that the information is based on scientific facts and therefore, reliable.

**Be Skeptical of Claims**

People may think they have learned facts about nutrition and dietary supplements by reading popular magazine articles, newspaper columns, or best-selling books; visiting Internet websites; or watching television news, infomercials, or home shopping network programs. In many instances, however, they have been misinformed. It is prudent to be skeptical and not believe what you read or hear about nutrition-related topics without investigating the credibility of their sources.

To be a careful consumer, do not assume that all nutrition information presented in the popular media is reliable. The First Amendment to the U.S. Constitution guarantees freedom of the press and freedom of speech, but the amendment does not protect consumers with freedom from nutrition misinformation or false nutrition claims. The U.S. Food and Drug Administration (FDA) can regulate nutrition- and health-related claims on product labels, but the agency cannot prevent the spread of health and nutrition misinformation published in books or pamphlets or presented in television or radio programs. As a consumer, you are responsible for questioning and researching the accuracy of nutrition information as well as the credentials of the people making nutrition-related claims.

Promoters of worthless nutrition products and services often use sophisticated marketing methods to lure consumers. For example, some promoters of dietary supplements claim their products are “scientifically tested” or they include citations to what appear to be scientific journal articles in their ads or articles. Consumers, however, cannot be certain the information is true. Few dietary supplements have been thoroughly evaluated by reputable scientists. In some instances, these products have been scientifically tested, but the bulk of the research has shown that most dietary supplements provide little or no measurable health benefits. Nevertheless, promoters of dietary supplements usually ignore the scientific evidence and continue to sell their goods to an unsuspecting trusting public. Consumers also need to be alert for promoters’ use of **pseudoscience**, the presentation of information masquerading as factual and obtained by scientific methods.

In many instances, pseudoscientific nutrition or physiology information is presented with complex scientific-sounding terms, such as “enzymatic therapy” or “colloidal extract.” Such terms are designed to convince people without science backgrounds that the nutrition-related information is true. Often, promoters of nutrition misinformation try to confuse people by weaving false information with facts into their claims, making the untrue material seem credible too.

Although people’s lives have improved as a result of scientific advancements in medicine, the general public tends to mistrust scientists, medical professionals, and the pharmaceutical industry. Promoters of nutrition misinformation exploit this mistrust to sell their products and services. For example, they may tell consumers that physicians rely on costly diagnostic methods and treatments for serious diseases because they are more interested in making money than doing what is best for their patients, such as recommending a dietary supplement. Are physicians driven by the desire to make money from their patients’ illnesses, and do they hide information about natural cures from them? Do pharmaceutical companies promote the use of their expensive medications instead of dietary supplements because the active ingredients in medications can be patented, and as a result, be highly profitable?

It is true that physicians need incomes to support themselves and their families and drug companies strive to make profits and recover the large amounts of money they spend on testing new drugs for safety and usefulness. However, people who tell you that the “medical/scientific establishment and drug companies are hiding informa-

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**pseudoscience** presentation of information masquerading as factual and obtained by scientific methods

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**GUARANTEED RESULTS**

- A scientifically sound formula so powerful you’ll see and feel its effects by taking only 1 capsule a day!
- A diet designed to burn Fat and keep it off!
- Groundbreaking tests have shown record results!

**World’s Most Potent Energy & FAT BURNING Drink!**

- Lose Quick
- New and Improved WEIGHT-LOSS FORMULA

**Laying the Foundation for Better Health**

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People may think they have learned facts about nutrition and dietary supplements by reading popular magazine articles, newspaper columns, or best-selling books; visiting Internet websites; or watching television news, infomercials, or home shopping network programs. In many instances, however, they have been misinformed. It is prudent to be skeptical and not believe what you read or hear about nutrition-related topics without investigating the credibility of their sources.

To be a careful consumer, do not assume that all nutrition information presented in the popular media is reliable. The First Amendment to the U.S. Constitution guarantees freedom of the press and freedom of speech, but the amendment does not protect consumers with freedom from nutrition misinformation or false nutrition claims. The U.S. Food and Drug Administration (FDA) can regulate nutrition- and health-related claims on product labels, but the agency cannot prevent the spread of health and nutrition misinformation published in books or pamphlets or presented in television or radio programs. As a consumer, you are responsible for questioning and researching the accuracy of nutrition information as well as the credentials of the people making nutrition-related claims.

Promoters of worthless nutrition products and services often use sophisticated marketing methods to lure consumers. For example, some promoters of dietary supplements claim their products are “scientifically tested” or they include citations to what appear to be scientific journal articles in their ads or articles. Consumers, however, cannot be certain the information is true. Few dietary supplements have been thoroughly evaluated by reputable scientists. In some instances, these products have been scientifically tested, but the bulk of the research has shown that most dietary supplements provide little or no measurable health benefits. Nevertheless, promoters of dietary supplements usually ignore the scientific evidence and continue to sell their goods to an unsuspecting trusting public. Consumers also need to be alert for promoters’ use of **pseudoscience**, the presentation of information masquerading as factual and obtained by scientific methods.

In many instances, pseudoscientific nutrition or physiology information is presented with complex scientific-sounding terms, such as “enzymatic therapy” or “colloidal extract.” Such terms are designed to convince people without science backgrounds that the nutrition-related information is true. Often, promoters of nutrition misinformation try to confuse people by weaving false information with facts into their claims, making the untrue material seem credible too.

Although people’s lives have improved as a result of scientific advancements in medicine, the general public tends to mistrust scientists, medical professionals, and the pharmaceutical industry. Promoters of nutrition misinformation exploit this mistrust to sell their products and services. For example, they may tell consumers that physicians rely on costly diagnostic methods and treatments for serious diseases because they are more interested in making money than doing what is best for their patients, such as recommending a dietary supplement. Are physicians driven by the desire to make money from their patients’ illnesses, and do they hide information about natural cures from them? Do pharmaceutical companies promote the use of their expensive medications instead of dietary supplements because the active ingredients in medications can be patented, and as a result, be highly profitable?

It is true that physicians need incomes to support themselves and their families and drug companies strive to make profits and recover the large amounts of money they spend on testing new drugs for safety and usefulness. However, people who tell you that the “medical/scientific establishment and drug companies are hiding informa-
tion about natural cures from you just to make money from your misery…” are using scare tactics to build mistrust in the medical establishment. People’s lives have been improved by contributions of medical researchers, such as physicians Salk and Sabin who developed vaccines for preventing polio and Marshall and Warren who determined that a bacterium was responsible for most peptic ulcers (Fig. 2.6). By discovering effective ways to prevent or treat serious diseases, medical researchers are likely to enjoy considerable positive worldwide recognition for their efforts, such as the Nobel Prize in medicine. Additionally, physicians have much to gain from treating their patients kindly and effectively. Consider this: If you follow a physician’s advice and have positive results, are you likely to be that doctor’s patient for a long time and recommend the practitioner to others?

What are the motives of the person who sponsors a nutrition-related website or promotes a nutrition-related book, supplement, or device? Do you think they are simply in the business of providing information and promoting their products because they care more about consumers’ health than making profits? Dietary supplement manufacturers, promoters, and sales outlets make considerable money as a result of consumer expectations in the health-promoting powers of their products. Sales of dietary supplements totaled nearly $19 billion in 2002. In a recent survey, 52% of adult Americans reported taking a dietary supplement during the past month.

Not all dietary supplement manufacturers or their promoters provide misleading or dishonest nutrition information. Nevertheless, some of these products may be harmful or a waste of money. Therefore, consumers must be careful when deciding whether to purchase dietary supplements.

Ask Questions

If you are like most people, you do not want to waste your money on things you do not need, or that are useless or potentially harmful. How can you become a more careful, critical consumer of nutrition-related information? The following questions should help you evaluate various sources of nutrition information:

- **What motivates the authors, promoters, or sponsors to provide the information?** Do you think they are more interested in your health and well-being or selling their products? Salespeople often have favorable biases toward the things they sell, and therefore they may not be reliable sources of information about these products. A clerk in a health food store,
for example, may wear a white lab coat and look as though he or she has a science or medical educational background, but you should keep in mind that the clerk was hired to sell dietary supplements and may have little or no scientific training. Furthermore, salespeople who work in health food stores may be unwilling to inform customers about the potential health hazards of taking certain products, particularly when they earn a commission from each sale.

- Does the promoter or advertisement rely on anecdotes or testimonials? As mentioned earlier, these sources of information are unreliable. Reliable nutrition information is research- or evidence-based.

- Does the article or ad claim the product caused dramatic positive results, such as miraculous cures for serious diseases or extraordinary weight losses? These claims are rarely true. Remember, if the claim sounds too good to be true, it probably is not true.

- Is the product touted as a new scientific breakthrough that has been kept “secret” by the medical or pharmaceutical “establishment”? Are there statements that attack the credibility and motives of conventional medical practitioners? Such statements indicate bias against the pharmaceutical industry or medical community. As a group, physicians are dedicated to improving their patients’ health and saving lives. Physicians have nothing to gain from concealing a cure from the public. They strive to diagnose and treat diseases using scientifically tested and approved techniques. Moreover, a physician may face a malpractice lawsuit if he or she fails to diagnose and treat a condition effectively.

- Does the source of information have disclaimers such as, “These results are not typical. Your results may vary.”? Disclaimers are clues that the product may not live up to your expectations or the manufacturer’s claims. FDA permits dietary supplement manufacturers to include certain health-related claims on their product labels. However, the label of products bearing such claims also must display the following disclaimer: “This statement has not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease” (Fig. 2.7).

- Is the source scientific, such as an article from a peer-reviewed nutrition journal? In general, popular sources of nutrition information such as articles in magazines are not peer-reviewed. Additionally, radio or TV programs that promote nutrition information may actually be advertisements for nutrition-related products.

- If a study is cited, how was the research conducted? Did the study involve humans or animals? If people participated in the study, how many subjects were involved in the research? Who sponsored the study? As mentioned earlier in this chapter, epidemiological studies are not useful for finding cause-and-effect relationships. Additionally, the results of studies involving large numbers of human subjects are more reliable than studies of animals. Sponsors may influence the outcomes of the studies they fund. To keep their readers more fully informed, many editors routinely disclose sponsors of the research articles published in their scientific journals.

- To provide scientific support for claims, does the source cite respected nutrition or medical journals or mention reliable experts? Be careful if you see citations to references in nutrition or medical journals. Promoters of nutrition misinformation may refer to scientific-appearing citations from phony medical journals to convince people that their information is reliable. Furthermore, be wary of nutrition experts introduced or identified as “Doctor” because they may not be physicians or persons with medical or nutrition/dietetics training. A so-called nutrition expert who is referred to as “Doctor” may have a doctorate degree (Ph.D.) in any subject area. Furthermore, someone with a Ph.D. may have obtained his or her degree simply by purchasing it through an Internet or mail order outlet, without having graduated from an accredited university or college.

Practicing medicine without the proper training and licensing is illegal. However, providing nutrition information and advice without the proper training and licensing is legal. Quackery involves promoting useless medical treatments. To
obtain information about a nutrition expert’s credentials, enter the person’s name at an Internet search engine and evaluate the results, or visit www.quackwatch.org and submit an “Ask a Question” email to the site’s sponsors.

• **Are only the benefits of using the product highlighted, whereas potentially harmful side effects ignored?** Anything you consume, even water, can be toxic in high doses. Beware of any source of information that fails to mention the possible side effects of using a dietary supplement or other nutrition-related product.

If you have a problem with your car’s functioning, you probably would want people who have the training, tools, and equipment to determine the problem and repair it. If you think something is wrong with your body, it is prudent to seek information and opinions from medical professionals who have the training and experience to diagnose and treat human health problems. Before purchasing and using a dietary supplement or nutrition-related device or service, check with your physician. Some products may interfere with conventional treatments, including prescribed and over-the-counter medicines; others may be dangerous to take.

### Look for Red Flags

To become a skeptical consumer of nutrition information, you need to be aware of “red flags,” clues that indicate a source of nutrition information is unreliable. Common red flags include:

1. **Promises of quick and easy remedies for health-related problems**, such as: “Our product helps you lose weight without exercise or dieting.”

2. **Claims that sound too good to be true**, such as: “Our all-natural product blocks fat and calories from being absorbed, so you can eat everything you like and still lose weight,” or “Why eat food when you’ll get all the nutrients you need by taking our supplements?”

3. **Scare tactics** that include frightening, false, or misleading statements about a food, dietary practice, or nutrition-related health condition, such as: “Dairy products cause cancer,” or “Children who eat meat and drink milk mature too early because of the hormones and chemical additives in these foods,” or “More Americans have cancer than ever before.”

4. **Attacks on conventional scientists and health care practitioners**, such as: “Physicians and drug company researchers don’t want you to know about natural remedies for cancer, diabetes, and heart disease because it will dry up their profits.”

5. **Statements about the superiority of natural dietary supplements and unconventional medical practices**, such as: “For centuries, Asians have been drinking green tea to control their weight,” or “For decades, Russian scientists have known about the countless health benefits of Siberian ginseng, but the American medical community ignores these findings.”

6. **Testimonials and anecdotes** as evidence of effectiveness, such as: “I lost 50 pounds in 30 days using this product,” or “I rubbed this vitamin E-containing lotion on my scar and it disappeared in days.”

7. **Information that promotes a product’s benefits while overlooking its risks**, such as: “Our supplement boosts your metabolism naturally so it won’t harm your system,” or “One hundred percent of the people who used our product to treat diabetes had excellent results.”

8. **Vague, meaningless, or scientific-sounding terms** to confuse consumers, such as: “Our all-natural, patented, chelated dietary supplement works best when compared to our competitors’ supplements,” or “The typical vegetable grown in the United States lacks high-grade nutrients because conventional farming methods have devitalized the soil.”
9. **Simplistic conclusions** drawn from complex studies, such as: “Eating yogurt prevents gastrointestinal problems,” or “Fish oil supplements prevent attention deficit disorder.”

10. **Sensational statements without citing complete references of sources**, such as: “Clinical research performed at a major university and published in a distinguished medical journal indicates food manufacturers have added ingredients to products that make you hungry and fat,” or “Millions of Americans suffer from nutritional deficiencies.”

11. **Recommendations based on a single study**, such as: “Research conducted at our private health facility proves coffee enemas can cure cancer.”

12. **Information concerning nutrients or human physiology that are not supported by reliable scientific evidence**, such as: “This book explains how to combine certain foods based on your blood type,” or “Most diseases are caused by undigested food that gets stuck in your guts,” or “People with alkaline bodies don’t develop cancer.”

13. **Sensational or frightening descriptions of commonly eaten foods**, such as: “White foods, such as sugar, milk, and refined flour, are toxic,” or “Eating processed foods causes cancer.”

14. **References to natural cures** that the medical establishment, pharmaceutical industry, and FDA are concealing from the public, such as: “For years it has been known that cider vinegar is a natural cure for cancer, but FDA suppresses this information because it wants consumers to buy patent medications to support the pharmaceutical industry.”

15. **Dramatic generalizations**, such as: “Our dietary supplement cured Mary’s diabetes; it can cure you too.”

16. **Disclaimers**, usually in small or difficult to read print, such as: “Results may vary,” or “Results aren’t typical” (Fig. 2.8).

### Using the Internet Wisely

You can find abundant sources of information about nutrition and the benefits of dietary supplements on the Internet. However, you must be careful and consider the sources. Who or what organization sponsors the site? Is the information intended to promote sales? Be wary if the site discusses benefits of dietary supplements and enables you to purchase these products online. Furthermore, a site is likely to be unreliable if it includes comprehensive disclaimers such as, “The manufacturer is not responsible or obligated to verify statements,” or “The FDA has not evaluated this website. This product is not intended to diagnose, cure, or prevent any disease.” Also avoid sites that publish disclaimers such as, “The nutrition and health information at this site is provided for educational purposes only and not as a substitute for the advice of a physician or dietitian. The author and owner of this site are not liable for personal actions taken as a result of the site’s contents.”

Be wary of websites that are authored or sponsored by one person, or sites that promote or sell products for profit (*.com) because such sources of information may be biased. In general, websites sponsored by nationally-recognized health associations such as the American Dietetic Association (www.eatright.org) and nonprofit organizations such as the National Osteoporosis Foundation (www.nof.org) are reliable sources of nutrition information. Additionally, government agencies (*.gov), and nationally accredited colleges and universities (*.edu) are excellent sources of credible nutrition information. Table 2.1 presents some tips for using the Internet to obtain reliable nutrition information.

The Federal Trade Commission (FTC) enforces consumer protection laws and investigates complaints about false or misleading health claims that appear on the Internet. For information to help you evaluate health product or service claims, visit the agency’s website (www.ftc.gov/bcp/online/edcams/cureall/). To complain about a product, you can complete and submit the FTC’s complaint form at the website or call the agency’s toll free line (1-877-382-4357).
TABLE 2.1 Tips for Searching Nutrition Information on the Internet

To be a careful consumer of Internet sources of information:
1. Use multiple sites, especially government sites, such as the Centers for Disease Control and Prevention (www.cdc.gov) and the Food and Drug Administration (www.fda.gov) as well as the sites of nationally recognized nutrition- or health-related associations such as the American Dietetic Association (www.eatright.org) and American Heart Association (www.americanheart.org).
2. Rely primarily on sites that are managed or reviewed by a group of qualified health professionals. "Blogs" might be fun and interesting to read, but they are not necessarily reliable.
3. Look for the Health on the Net symbol at the bottom of the main page of the website. The Health on the Net Foundation is a nonprofit, international organization that promotes the HONcode, a set of principles for standardizing the reliability of health information on the Internet. Currently, website sponsors are not required to follow HONcode standards. For more information about HONcode, you can visit the organization's website (www.hon.ch/).
4. Do not trust information at a site that does not indicate valid sources, such as well-respected peer-reviewed scientific journals or nationally-recognized universities or medical centers. Contributing authors and their credentials should be identified; when they are, perform an online search of the scientific journals, as well as the authors' names and credentials to determine their validity.
5. Do not trust a site that includes attacks on the trustworthiness of the medical or scientific establishment.
6. Avoid sites that provide online diagnoses and treatments.
7. Be wary of commercial sites (*.com) with links to government sites or the sites of well-known medical, nutrition, or scientific associations. An unreliable *.com site can be linked to reliable sites without having received their endorsements.
8. Avoid providing your personal information at the site because its confidentiality may not be protected.

In addition to the American Dietetic Association's website, you can find reliable nutrition and health information at:
- The National Institutes of Health   www.nih.gov/
- The Food and Drug Administration   www.fda.gov
- Department of Agriculture   www.usda.gov/wps/portal/usdahome
- The Centers for Disease Control and Prevention   www.cdc.gov/
- American Council on Science and Health   www.acsh.org/
- Quackwatch   www.quackwatch.org
- The National Council Against Health Fraud   www.ncahf.org/

8. What is the difference between a testimonial and an anecdote?
9. List at least three “red flags” that may indicate a questionable source of nutrition information.
10. List at least three tips for using the Internet as a reliable source of nutrition information.
Why Consult a Registered Dietitian?

If you have questions about food or nutrition, where do you find the answers? Although some states regulate and license people who call themselves nutritionists, you cannot always rely on someone who refers to him- or herself as “nutritionist” or “nutritionalist” for reliable nutrition information, because there are no standard legal definitions for these descriptors. Should you ask a physician for nutrition advice? In general, physicians are not necessarily the best sources of nutrition information, because most doctors do not have extensive college coursework in the subject.

To obtain reliable answers to your nutrition, foods, and dietary information, you should consult a registered dietitian (R.D.). Registered dietitians are college-trained professionals who have extensive knowledge of foods, nutrition, and dietetics, the application of nutrition and food information to treat many health-related conditions. The title “registered dietitian” is legally protected.

Many dietitians provide dietary counseling for patients in hospitals or other clinical settings. Some dietitians provide nutrition advice for clients who obtain preventive health care from local government sources, such as health departments in their communities. Other dietitians manage food systems for hospitals, school districts, or large corporations. If your university or college has a nutrition or dietetics department, you are likely to find registered dietitians who are faculty members. Otherwise, you can locate registered dietitians by consulting the yellow pages of telephone directories, contacting your local dietetic association, calling the dietary department of a local hospital, or visiting the American Dietetic Association’s website (www.eatright.org/find.html) or the Canadian Dietetic Association’s website (www.dietitians.ca). Make sure the person has the credentials “R.D.” after his or her name (“R.D.” is also used in Canada). The Chapter 2 Highlight provides more information about registered dietitians, including college courses that are required for students who major in dietetics.

11. What is the difference between a nutritionist and a registered dietitian?
12. List three ways of locating registered dietitians.

Chapter 2 Highlight
Have You Considered Becoming a Dietitian?

Are you interested in science? Would you like to learn how diets can be altered to treat disease? Would you like a challenging career as a health professional? If you answered “yes” to each of these questions, you may want to consider becoming a registered dietitian (R.D.). There are three major professional divisions for registered dietitians—clinical dietetics, community nutrition, and food service systems management. Clinical dietitians can work as members of medical teams in hospitals or clinics. Registered dietitians can also work as community nutritionists in public health settings or as dietary counselors in private practice or with wellness programs. Food service systems management dietitians direct food systems in hospitals, schools, or other settings. Although most registered dietitians work in health care settings, some are educators or researchers.
**Grandma's Chicken Soup**

Long before the advent of over-the-counter antihistamines and cough syrups, there was chicken soup. Sometimes referred to as “Jewish penicillin,” people have used chicken soup as a cold remedy for over 1000 years. Chicken soup is not a cure for the common cold. However, results of a laboratory study indicated chicken soup contains substances that can subdue the body’s inflammatory response to upper respiratory tract infections.¹ This inflammatory response typically results in common cold symptoms such as cough and excess nasal discharge. Although the soup’s specific actions on cold-causing microbes still need to be determined, consuming a soothing, warm bowl of chicken soup contributes to the sick person’s fluid and other nutrient intake at a time when he or she may not feel like eating anything else. Even if you don’t have a cold, the following chicken soup recipe is delicious and easy to make. You can freeze the soup in small covered plastic containers for future meals.


**Note:** When you reheat the soup, you can also add your favorite soup ingredients, such as corn kernels, frozen peas or string beans, broccoli florets, fine noodles, or cooked brown rice.

**INGREDIENTS:**

1. package of raw chicken wings, approx. 3 to 4 lbs
2. 1 large onion, cut in wedges
3. 4 large carrots, cleaned and cut into 3-inch lengths
4. 1/8 tsp black pepper
5. 1 chicken bouillon cube
6. 3 celery stalks, cleaned and cut into 3-inch lengths
7. parsley sprigs
8. 1/8 tsp paprika
9. 1/8 tsp thyme
10. 1/8 tsp curry seasoning

**PREPARATION STEPS:**

1. Place the raw chicken in a large cooking pot and add enough cold water to cover chicken, approximately 2 quarts of water.
2. Add onion, carrots, celery, parsley, pepper, bouillon cube, and spices to chicken and water; turn burner on high. When mixture comes to a boil, reduce heat to medium and cover the pot with a lid. Soup should boil for at least an hour.
3. Turn off the heat, remove chicken wings from the soup, and place them in a bowl. Cover and refrigerate.
4. Cover soup and refrigerate for 12 hours.
5. Skim chicken fat from top of soup. Remove skin from the wings, separate the meat from the bones, and add the meat to the soup. Reheat soup before eating.
6. Cover and store leftover soup in refrigerator for up to 3 days, or freeze.

**Recipe for Healthy Living**

There are two pathways students can take to become dietitians. A Coordinated Program (CP) combines classroom instruction with at least 900 hours of supervised professional practice experience. A Didactic Program in Dietetics (DPD) provides classroom courses, and after graduation, students need to complete a dietetic internship program, which provides at least 900 hours of supervised practice experience and generally takes six months to a year to complete. After completing a CP or dietetic internship program, students are eligible to take the national examination to become registered dietitians. To maintain their certification, registered dietitians must continually update their knowledge in the field of dietetics and obtain continuing education credits.
SUMMARY

Scientists ask questions about the natural world and follow generally accepted methods to obtain answers to these questions. Nutrition research relies on scientific methods that may involve making observations, asking questions and developing possible explanations, performing tests, collecting and analyzing data, drawing conclusions from data, and reporting on the findings. Other scientists can test the findings to confirm or reject them.

Epidemiology is the study of disease rates among different population groups, factors associated with the occurrence of diseases, and ways to control the spread of diseases in a population. By studying differences in dietary practices and disease occurrences among populations, epidemiologists can suggest nutrition-related hypotheses for the prevalence of certain diseases. Epidemiologists often conduct case-control, prospective, and retrospective studies to provide clues about the causes, progression, and prevention of the disease. Epidemiological studies, however, cannot indicate whether two variables are correlated, because the relationship could be a coincidence.

When an experiment or study is completed and the results analyzed, researchers summarize the findings and seek to publish articles with information about their investigations in scientific journals. Before articles are accepted for publication, they undergo peer review. Scientists generally do not accept a hypothesis or the results of a study until they are supported by considerable research evidence. Thus, researchers often face stiff criticism and rejection from members of the medical establishment when their hypotheses or findings contradict accepted nutrition principles. Media coverage of a medical breakthrough is not necessarily an indication of the value or quality of research that resulted in the news story. More research is often necessary for scientists to determine whether the results are valid and can be generalized.

Consumers may think scientists do not know what they are doing when conflicting research findings are reported in the media. However, consumers need to recognize that conflicting findings often result because different teams of researchers use different study designs when investigating the same hypothesis. Furthermore, each team of scientists may analyze the results differently. Other factors, such as genetic and lifestyle differences, can also influence the results of nutrition research involving human subjects. The science of nutrition is constantly evolving.

Although testimonials and anecdotes are often used to promote nutrition-related products and services, consumers cannot be sure that this information is reliable or based on scientific facts. Personal observations are not evidence of a cause-and-effect relationship because many factors, such as lifestyle and environment, can influence outcomes.

Popular magazine articles, best-selling trade books, Internet websites, television news reports, and other forms of media are often unreliable sources of nutrition information. Consumers need to be skeptical and question the reliability of such sources, because the First Amendment to the U.S. Constitution guarantees freedom of the press and freedom of speech. People who promote nutrition misinformation often benefit from these freedoms.

Few dietary supplements have been thoroughly evaluated by reputable scientists, and many supplements that have been scientifically tested do not provide measurable health benefits. Nevertheless, promoters of dietary supplements often ignore results of scientific research that indicate their products are not effective. Furthermore, they often use consumer mistrust of the scientific and medical establishment to sell their products and services.
Consumers need to become more knowledgeable about the basics of human nutrition and physiology, and they need to be skeptical about the reliability of the nutrition information that is so readily available in the press, magazines, and on the Internet. To determine whether a source of information is reliable, consumers need to ask questions to determine the author’s reasons for promoting the information. Consumers should also look for red flags, such as scare tactics and claims that sound too good to be true.

Much of the nutrition information that is on the Internet is unreliable and intended to promote sales. Websites sponsored by nonprofit organizations, nationally recognized health associations, government agencies, and nationally accredited colleges and universities are generally reliable sources of information.

Although some states regulate and license nutritionists, there is no standard legal definition for “nutritionist” in the United States. For reliable food, nutrition, and dietary information, consumers can consult registered dietitians. Consumers can locate registered dietitians at many universities and colleges or by consulting the yellow pages of telephone directories, contacting local dietetic associations, calling the dietary departments of local hospitals, or visiting the American Dietetic Association’s website.

CRITICAL THINKING

1. A news broadcaster reports the results of a study in which people who took daily fish oil and vitamin E supplements did not reduce their risk of heart attack. Moreover, the researchers stopped the study when they determined the supplements increased the subjects’ risk of stroke! Explain how you would determine whether this information is reliable.

2. Explain how you can verify the reliability of advice about vitamins provided at an Internet website.

3. Design a study that involves observing nutrition-related practices of college students and share your idea with the class. Your study should be designed so that it is ethical and does not harm subjects physically or psychologically.

4. Results from one scientific study often suggest a new set of questions for researchers to investigate. Chapter 2 described current research that suggests a relationship between soy foods and the risk of breast cancer. Think of two questions this finding is likely to generate that could be answered by further scientific investigation.

5. Browse through popular health related magazines to find an article or advertisement that relates to nutrition, and make a copy of the article or advertisement. Analyze each sentence or line of the article or advertisement for signs of unreliability. Is the article or advertisement a reliable source of information? Explain why it is or why it is not.


PRACTICE TEST

Select the best answer.

1. The first step of the scientific method usually involves
   a. gathering data.
   b. developing a hypothesis.
   c. identifying relationships between variables.
   d. making observations.

2. A group of scientists observe a group of college students over 4 years to determine which of their characteristics leads to weight gain. This study is an example of
   a. a case-control study.
   b. a prospective study.
   c. a retrospective study.
   d. an experimental study.

3. ______ includes the study of disease rates among different population groups.
   a. Epidemiology
   b. Technobiology
   c. Diseasiology
   d. Censusology

4. Comparing characteristics of individuals with iron-deficiency anemia to individuals who match the characteristics but are healthy would be an example of
   a. a prospective study.
   b. an anecdotal study.
   c. a retrospective study.
   d. a case-control study.

5. Generally, epidemiological studies
   a. establish causation.
   b. prove correlations.
   c. cannot determine cause-and-effect relationships.
   d. are experimental-based research between two variables.

6. Which of the following journals does not have peer-reviewed articles?
   a. Journal of the American Medical Association
   b. American Journal of Clinical Nutrition
   c. Journal of the American Dietetic Association
   d. none of the above
7. The government agency that enforces consumer protection laws by investigating false or misleading health-related claims is the
   b. Environmental Protection Agency (EPA).
   c. Agricultural Research Service (ARS).
   d. Centers for Disease Control and Prevention (CDC).

8. A testimonial is
   a. an unbiased report about a product’s value.
   b. a scientifically valid claim.
   c. a personal endorsement of a product.
   d. a form of scientific evidence.

9. Which of the following websites is most likely to provide biased and unreliable nutrition information?
   a. the site of a nationally recognized health association (*.org)
   b. a site that promotes or sells dietary supplements (*.com)
   c. the site of a U.S. government agency (*.gov)
   d. an accredited college or university’s site (*.edu)

10. A fake treatment is a(n)
    a. anecdote.
    b. double-blind study.
    c. pseudoscience experiment.
    d. placebo.